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# TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENTAL STATION  
U.S. DEPARTMENT OF AGRICULTURE . . . FOREST SERVICE

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## Water Sprays Will Shorten Charcoal Cooling Time

Charcoal is produced in kilns by carbonizing wood at about 800° to 950° F. Following carbonization, the kiln is sealed to prevent air entry and allowed to cool. Kiln temperatures must fall below 200° F. before it is considered safe to open for unloading.

Kilns are usually cooled by natural radiation of heat through the walls and ceiling. Rate of cooling depends primarily on the thermal conductivity of the structure. Time required for cooling by natural radiation is usually greater than the carbonization time.

In August 1959, the Lake States Forest Experiment Station made a preliminary test with water sprays as a means of reducing cooling time. Water was sprayed over the top of charcoal in a 3-cord kiln. Spraying, begun immediately after carbonization was complete and when kiln temperatures were about 900° F., was continued intermittently for 4 hours until kiln temperatures were about 200° F. A total of 650 gallons of water were injected through two spray nozzles mounted on a 3/4-inch-diameter supply pipe. Weight of the charcoal in the kiln was about 2,100 pounds.

Cooling time with spraying was 13 hours compared with an average of 60 hours by natural radiation (fig. 1).

The results of this test, as well as exploratory work reported by Hicock et al.<sup>1/</sup> and Kotok,<sup>2/</sup> indicate that water sprays may be an effective means for reducing cooling time in charcoal kilns. More research is needed to improve the technique and to determine any effects cold-water sprays may have on kiln structures and the quality of charcoal.

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1/ Hicock, H. W., Olson, A. R., and Callward, F. M. The Connecticut charcoal kiln. Univ. Conn. Agr. Expt. Sta. Bul. 431, 48 pp., illus. 1951.

2/ Kotok, E. W. The production of charcoal from Arizona mesquite. U. S. Forest Serv., Rocky Mountain Forest and Range Expt. Sta. Res. Note 15, 6 pp. 1955. (Processed.)

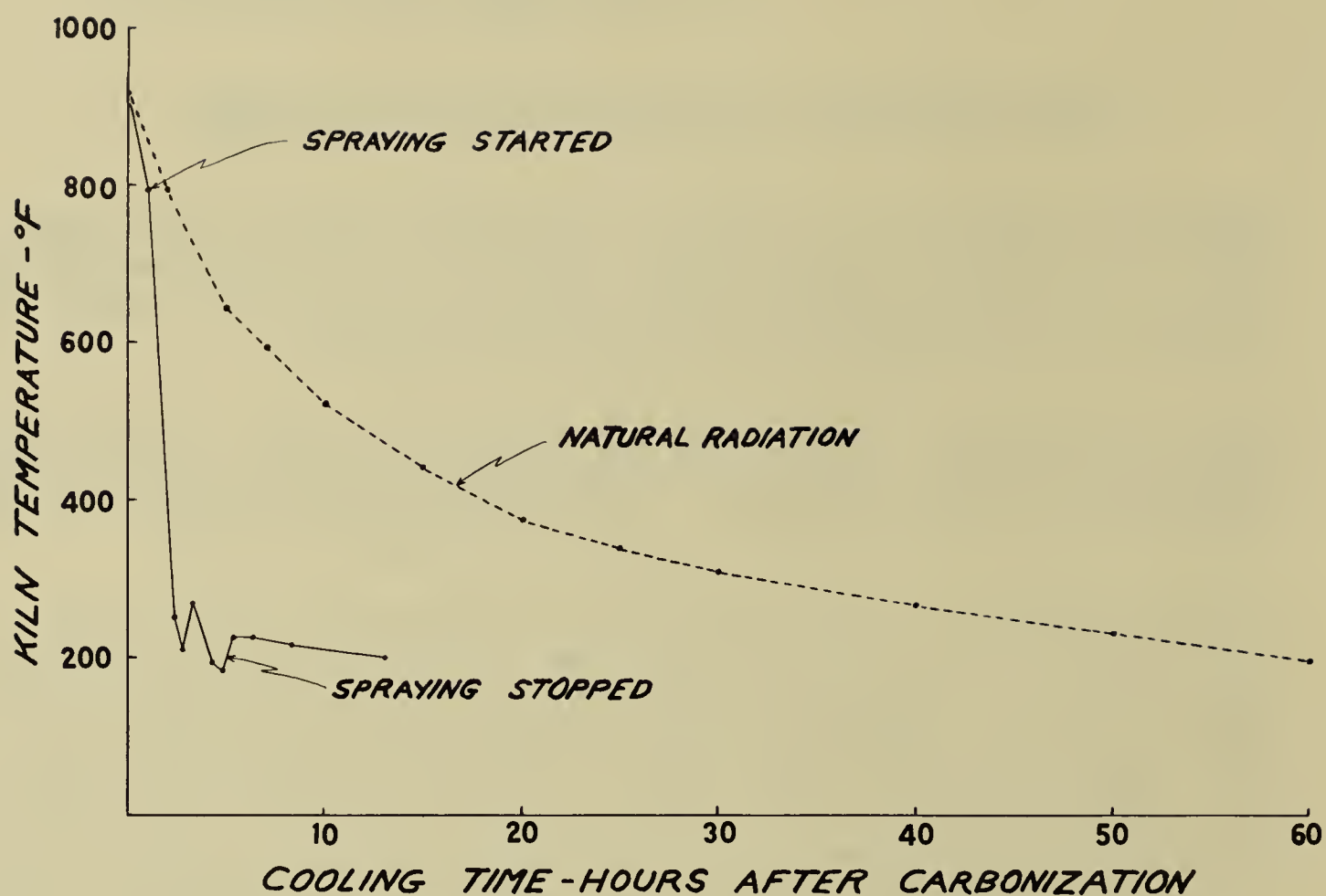


Figure 1.--Cooling curves for experimental 3-cord charcoal kilns; the use of water sprays compared with natural radiation. Temperature fluctuations during water spraying were caused by intermittent spraying. The natural radiation curve was based on seven experimental burns; the water-spray curve on one burn.